A New Security Model for Collaborative Environments

Presenter – Deb Agarwal*

Markus Lorch**, Mary Thompson*, and Marcia Perry*

*Lawrence Berkeley Laboratory

**Virginia Tech

Motivation

- Often a collaboration begins with just two or three members who decide to work together
- Entry into the collaboration is often through an introduction or invitation by an existing member
- Collaborators prefer to use secure systems for their interactions
- The administrator is not generally available when new people need to be added or their privileges upgraded
- Collaborators build trust in each other through interaction
- Denial of service for legitimate users has serious consequences and will lead to use of insecure systems if available or lack of adoption

Security Mechanisms

- Authentication mechanisms
  - Username/password
  - Kerberos
  - X.509 certificates
  - Public/private key pair
- Authorization mechanisms
  - Group membership (unix)
  - Access Control Lists (ACLs)
  - Authorization servers (Akenti and CAS)
- Secure communication
  - SSL/TLS
  - Grid Security Infrastructure
  - Kerberos
  - Web Services mechanisms
- All designed to require no real-time human intervention for users to gain access

Interoperation

- Cross-organization trust (same mechanisms)
  - — Authentication and authorization policies
  - — Security of database
- Translation gateways (map credentials between mechanisms)
  - — Gridmap – X.509 -> username/password
  - — Gateway between Kerberos and X.509

Scenarios

- Meet a new person at a conference and want to add them to the collaboration immediately
- On travel and need to attend a meeting but your only Internet access is in an Internet café
- At a conference and start a discussion that you would like to use collaborative tools to continue
- Long-term evolving collaboratory that is cross-organizational

Requirements

- Ability to access from anywhere including Internet cafés
- Low threshold for entry into the system
  - — Incorporate new users easily
  - — Small amount of software downloads
  - — No waiting for authorization to enter the system
- Components able to require only the level of authentication and authorization they need. E.g.
  - — Weak or no authentication to enter the lobby
  - — Strong authentication and authorization for sensitive actions
- Minimize dependence on servers (particularly while the collaboration is small in number)

Scenarios Revisited

- Trusted user accessing from a machine with X.509 credentials
- Trusted user connecting with username and password
- Trusted user connecting without X.509 or password access
- New user wishing to join a single session
- New user that wants to join and start collaborating
- Group of users that want to spontaneously create a collaboration

Registration Model

- Registration methods
  - Self
  - Trusted user
  - Administrator
- Registry user information
  - User name
  - Password
  - X.509 credential
  - Organizational affiliations
  - Group affiliations
  - Method of registration

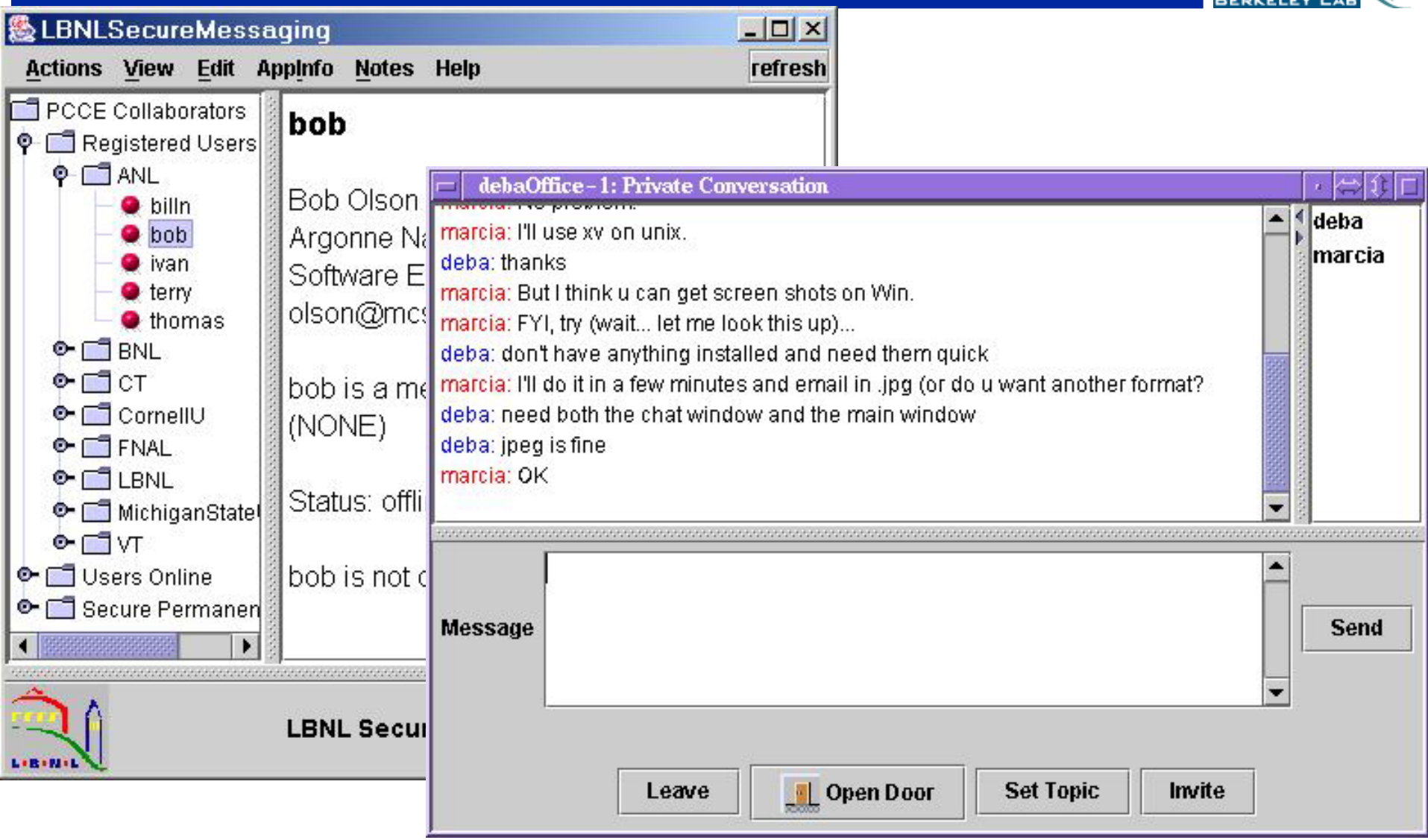
Authentication Model

- A user has multiple means of authentication
- Authentication for a particular session based on
  - Location
  - Methods available
  - Security of local machine
  - Availability of connection to servers
- Authentication method for a session a property of a user's session
- Authentication method considered in authorization

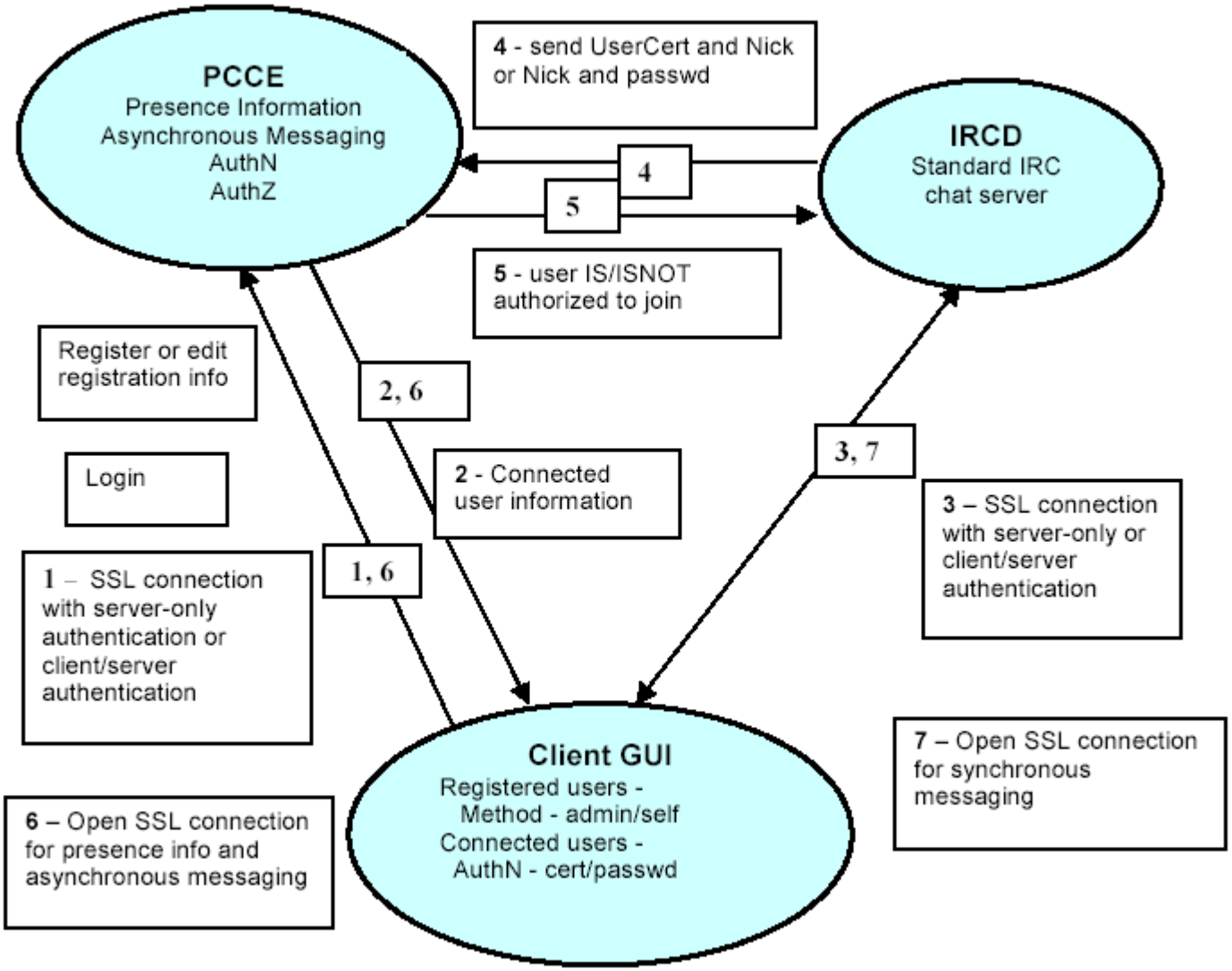
Crossing the borders

- Escort
  - Chaperone a user in an area they are not normally authorized to access
  - Only provides privileges of the host or less
  - Host able to control the guest's access
- Vouching
  - A user vouches for a less privileged user
  - Temporarily elevates privileges of the vouchee
  - Vouchee able to act without escort
- Elevation of credentials
  - Registration of user's credentials to allow higher privileges – can be done by anyone with the higher credential level

Secure Messaging



PCCE Connection Model



Authorization Issues

- Authorization decision points/coordination
  - — Joining a private conversation
  - — Entering a shared venue
  - — Looking at files/shared date
- Authorization decision needs to take into account
  - — Method of registration
  - — Method of authentication
  - — Vouching information
- Escort affect on authorization
  - — Filter escorted user's access to real-time information
- Limitation of access granted by vouching

Issues

- Hierarchical ordering of authentication methods
- Communication method to connect users that are authenticated at different levels
- Cross-organization authentication
  - — Easier
  - — Harder
- Authorization complexity
  - — Policy language to support this model
- Registration of credentials
  - — By user
  - — Administrator/trusted user vetting